IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Nathanial Bair

Group Art Unit: 2882

Serial No.: 10/662,500

Examiner: Craig E. Church

Filed: September 15, 2003

For: COMPUTER TOMOGRAPHY SCANNER

Attorney Docket No.: 67102-013

APPEAL BRIEF

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

This Appeal Brief is submitted pursuant to the Notice of Appeal filed February 24, 2006.

Real Party in Interest

The real party in interest is Xoran Technologies, Inc. the Assignee of the entire right and interest in this application by assignment recorded for the parent patent application at Reel 014500, Frame 0135.

Related Appeals and Interferences

There are no related appeals and interferences.

Status of the Claims

Claims 1-39 are pending.

Claims 1-39 are rejected.

Status of Amendments

No Amendment After Final was filed.

Summary of the Invention

The present invention relates generally to computer tomography (CT) scanners and more particularly to a more compact CT scanner. Generally, computer tomography scanners are large enough to scan a patient's entire body. Typically, an x-ray source is mounted on a movable ring, which also includes an array of x-ray detectors opposite the x-ray source. The patient lies on a platform that moves through the ring. The ring is rotated so the x-ray source and detectors revolve around the patient, while the patient is moved through the ring on the platform. The x-ray slices through the body by taking a series of x-rays in a spiral pattern. The x-ray source is typically a "fan beam" x-ray source, i.e., it sends a fan-shaped beam that defines a single plane through the body and is received by the detectors.

These scanners are very large because they are capable of scanning an entire body and must include a platform movable through the x-ray source and detectors. An entire room is often dedicated to such a scanner and its associated equipment.

The present invention provides a smaller, self-contained, lower cost CT scanner 20, such as that shown in Figure 1, reproduced below.

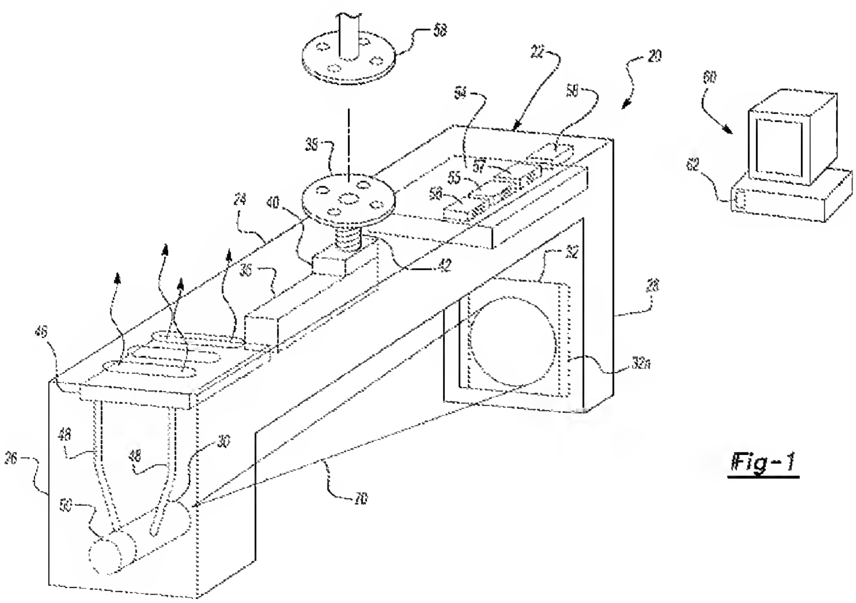

Fig-1

The scanner 20 includes a gantry 22 on which the x-ray source 30 and x-ray detector 32 are mounted. A motor 36 in the gantry 22 controls rotation of the gantry 22 relative to a mounting plate 38 from which the gantry is supported. (Page 2, line 22 to Page 3, line 3).

The CT scanner 20 may optionally include an on-board computer 54 including a microprocessor or CPU 55, memory 56, a hard drive 57 and/or other optical, magnetic, electronic or other mass storage, and other hardware and software for performing the functions described herein. The processor 54 in the disclosed embodiment may perform at least these three functions: First, the computer 54 controls the rotation of the CT scanner 20 by controlling the motor 36. Second, the computer 54 also controls the x-ray source 30, including powering the source 30 on and off and varying the intensity of the produced x-ray. Third, the computer 54 collects the data from the detector 32 and stores it for later collection, such as in memory 56 or storage 57. If the detector 32 is movable to the position shown as detector 32a, the computer 43 also controls the movement and position of the detector 32 relative to the arm 28, via a motor or other means. (Figure 1, Page 4, lines 3-15).

The computer 54 includes a wireless transmitter 58 for transmitting the data after collection to an off-board computer 60 that includes a complementary wireless receiver 62. The off-board computer 60 processes the data collected by the CT scanner 20 to create the 3D models and images. Optionally, the computer 54 could be connected via traditional wires or optical connections to the computer 60. Communication and power may be provided to the CT scanner 20 through wires (not shown) passing through mounting plates 38 and 58. (Figure 1, Page 4, lines 16-22).

The CT scanner 20 is self-container and easy to install. For installation, the gantry 22 can be simply mounted to the ceiling or a mounting arm. Data wiring can be eliminated if the wireless transmission is used.

Independent claim 1 recites a CT scanner 20 having an x-ray source 30 and an x-ray detector mounted to a gantry 22 and a motor 36 mounted to the gantry 22. The CT scanner 20 can be installed simply by securing the motor 36 to the ceiling or a mounting arm.

Independent claim 14 recites a CT scanner 20 having an x-ray source 30 and an x-ray detector mounted vertically downward of a cross bar 24 of a gantry 22. A computer 54 is mounted to the gantry 22. Because the computer 54 is mounted to the gantry 22, much of the control and processing is performed on board the gantry 22, without data wiring to the rotating gantry 22 (or with less data wiring to the gantry 22). Thus, the self-contained CT scanner 20 is simpler to install.

Independent claim 21 recited a CT scanner 20 having a gantry 22 having an x-ray source 30 and x-ray detector 32 mounted to the gantry 22. A mount 38 is rotatably mounted to the gantry 22. A motor 36 is mounted to at least one of the gantry 22 and the mount 38 for selectively imparting relative motion between the gantry 22 and the mount 38. A computer 54 is mounted to the gantry, the computer 54 controls the relative motion of the mount 38 and the gantry 22 and the computer 54 controls the x-ray source 30. The inclusion of the motor 36, mount 38 and computer 54 in the CT scanner 20 makes installation simpler.

Independent claim 25 recites a method of imaging a portion of a body. The method includes taking a series of images from the detector 32 from a plurality of positions about the body. The method further includes the step of storing the series of images in a first location while revolving with the detector 3

<u>Grounds of Rejection to Be Reviewed on Appeal</u>

I) Claims 14-20, 25-32 and 37-39 have been rejected under 35 U.S.C. 112, second paragraph as being indefinite.

II) Claims 14-17, 20-22, 25-27 and 31-39 have been rejected under 35 U.S.C. §103(a), as being unpatentable over Ning (US 6,480,565) in view of Graumann (US 6,496,558).

III). Claims 18, 19, 23, 24 and 28-30 have been rejected under 35 U.S.C. §103(a), as being unpatentable over Ning and Graumann.

IV) Claims 1-13 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Ning and Graumann.

<u>Argument</u>

<u>Claims 14-20, 25-32 and 37-39 are not Indefinite</u>

The Examiner has rejected claims 14-20, 25-32 and 37-39 under 35 U.S.C. § 112, second paragraph. Applicant disagrees. The specification and claims make it clear that the "crossbar" claimed is simply that portion of the structure in the gantry from which the source and detector extend downwardly. It appears that the Examiner has used this broad interpretation of the term in his art rejections.

<u>Claims 14-17, 20-22, 25-27 and 31-39 are not Obvious</u>

Claims 14-17, 20-22, 25-27 and 31-39 are rejected as obvious over Ning (US 6,480,565) in view of Graumann (US 6,496,558). The Examiner admits that Ning does not disclose that the source and detector are below the cross bar as claimed. The Examiner argues that it would be obvious to modify Ning so that the source and detector extend downwardly from the gantry, in light of Graumann, and use it for cranial imaging. However, this modification of the Ning CT scanner would be completely contrary to the teachings and intended purpose of Ning. "If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon,* 733 F.2d 900, 221 UPSPQ 1125 (Fed. Cir. 1984); MPEP 2143.01. The entire disclosure of Ning is directed toward the particular situation of imaging breasts with a CT scanner. The source and detector of Ning must extend *upward* from the gantry so that the breast can be imaged while being extended downward through a hole in the table (e.g. Figure 2F). An alternative embodiment (shown in Figure 2E) permits the breast to be imaged while the patient is vertical; however, neither of these embodiments shows a source and detector extending *downward* from a cross bar of a gantry. Nor could a breast be imaged in either of the positions shown in Ning with the claimed configuration. Therefore, at least claims 14 and 25 are patentable over Ning and Graumann.

<u>Claims 18, 19, 23, 24 and 28-30</u>

Claims 18, 19, 23, 24 and 28-30 are rejected as obvious over Ning in view of Graumann.

<u>Claim 18</u>

The Examiner admits that Ning does not disclose an onboard computer generating 3D images, but argues that it would be obvious to modify Ning to do so in order to "shorten processing time by eliminating data transfer." There is no indication in Ning or elsewhere that performing the image reconstruction on the onboard computer would "shorten processing time" or "eliminate data transfer." Since the CPUs 310 and 328 are already connected via slip ring 304, there is no reason to "eliminate data transfer," since the frame images can be transferred rapidly to the CPU 328 during scanning via the slip ring 304.

Claim 19

In fact, since wireless transmission of data is normally slower than wired transmission of data, the Examiner's proposed motivation ("shorten processing time by eliminating data transfer") would fail in particular with respect to claims 19, 24 and 30. Although the Examiner argues that the wireless transmission of images is "notorious," the Examiner does not cite a reference showing the wireless transmission of images in a CT system. Normally, in a CT scanner wireless transmission of images would be completely unnecessary. In Ning, for example, there is a slip ring 304 connection from the gantry to the host computer for transmitting data. The CT system of the present invention is intended to be easily transportable and easily installed. The wireless communication of the data from the gantry greatly facilitates installation and transport. With the slip ring connection available in the Ning CT system, there is no need for adding wireless communication to the Ning CT system. Therefore, claims 19, 24 and 30 are independently patentable.

Claims 1-13 are not Obvious

The Examiner has rejected claims 1-13 as obvious over Ning in view of Graumann.

Claim 3

Claim 3 specifies that the motor is fixed to the gantry and that the motor imparts relative rotation between the mounting plate rotates and the gantry (from claim 2). As indicated above, the motor 212 of Ning is not mounted on the gantry as recited in claim 1.

Claim 4

Claim 4 depends from claim 3 and further recites that the motor imparts translational movement of the gantry. In Ning, translational movement of the gantry is provided by a separate motor 214, not the same motor 212 that rotates the gantry. Therefore, claim 4 is independently patentable.

Claim 7

Claim 7 recites that the computer mounted to the gantry controls the x-ray source and sends signals to the motor to control rotation of the gantry. Ning does not disclose or suggest using the same on-board computer to control the x-ray source and an on-board motor.

Closing

Please charge $250.00 (small entity) for the Filing of a Brief in Support of an Appeal to Deposit Account No. 50-1482. If any further fees are necessary, you are hereby authorized to charge Deposit Account No. 50-1482 in the name of Carlson, Gaskey & Olds, PC.

Respectfully submitted,

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Claims Appendix

1. A computed tomography scanner comprising:

a gantry;

an x-ray source mounted to the gantry;

an x-ray detector mounted to the gantry opposite the x-ray source; and

a motor mounted to the gantry.

2. The computed tomography scanner according to claim 1 further including a mounting plate secured to the motor, such that the motor imparts relative rotation between the mounting plate and the gantry

3. The computed tomography scanner of claim 2 wherein the motor is fixed to the gantry, such that the mounting plate rotates relative to the motor and gantry.

4. The computed tomography scanner of claim 3 wherein the motor also imparts translational movement of the gantry relative to the mounting plate.

5. The computed tomography scanner according to claim 1 further including a computer mounted to the gantry.

6. The computed tomography scanner according to claim 5 wherein the computer sends signals the motor to control the rotation of the gantry.

7. The computed tomography scanner of claim 5 wherein the computer controls the x-ray source.

8. The computed tomography scanner of claim 5 wherein the computer controls movement of the x-ray detector relative to the gantry.

9. The computed tomography scanner of claim 5 wherein the computer processes images collected from the x-ray detector.

10. The computed tomography scanner of claim 9 wherein the computer creates a three-dimensional model based upon the images collected from the x-ray detector.

11. The computed tomography scanner of claim 1 wherein the x-ray detector is movable relative to the gantry.

12. The computed tomography scanner of claim 1 wherein the gantry includes a housing in which the x-ray source is at least partially mounted.

13. The computed tomography scanner of claim 1wherein the x-ray source is a cone-beam x-ray source.

14. A computed tomography scanner comprising:

a gantry including a cross bar;

an x-ray source mounted to the gantry vertically downward of the cross bar;

an x-ray detector mounted to the gantry vertically downward of the cross bar and positioned horizontally opposite the x-ray source; and

a computer mounted to the gantry.

15. The computed tomography scanner of claim 14 wherein the computer controls the x-ray source.

16. The computed tomography scanner of claim 14 wherein the computer controls movement of the x-ray detector relative to the gantry.

17. The computed tomography scanner of claim 14 wherein the computer processes images collected from the x-ray detector.

18. The computed tomography scanner of claim 17 wherein the computer creates a three-dimensional model based upon the images collected from the x-ray detector.

19. The computed tomography scanner of claim 18 further including a wireless transmitter on the gantry, the transmitter transmitting the three-dimensional model from the computer.

20. The computed tomography scanner of claim 14 further including a mount rotatable relative to the gantry, the computer movable with the gantry relative to the mount.

21. A computed tomography scanner comprising:

a gantry;

an x-ray source mounted to the gantry;

an x-ray detector mounted to the gantry opposite the x-ray source;

a mount rotatably mounted to the gantry;

a motor mounted to at least one of the gantry and the mount, the motor selectively imparting relative motion between the mount and the gantry; and

a computer mounted to the gantry, the computer controlling rotation of the gantry relative to the mount by the motor, the computer controlling the x-ray source.

22. The computed tomography scanner of claim 21 wherein the computer processes images collected from the x-ray detector.

23. The computed tomography scanner of claim 22 wherein the computer creates a three-dimensional model based upon the images collected from the x-ray detector.

24. The computed tomography scanner of claim 23 further including a wireless transmitter on the gantry, the transmitter transmitting the three-dimensional model from the computer.

25. A method for imaging a portion of a body including the steps of:

a) positioning the body part between a source and a detector and below a cross bar connecting the source and the detector;

b) revolving the source and the detector about the body part;

c) taking a series of images from the detector from a plurality of positions about the body part during step b); and

d) storing the series of images in a first location revolving with the detector in step b).

26. The method of claim 25 further including the step of:

e) transmitting the series of images stored in said step d) after said steps a-d) to an off-board storage.

27. The method of claim 25 further including the step of:

e) generating a three-dimensional model of the body part from the series of images.

28. The method of claim 27 wherein said step e) is performed at a second location revolving with the detector in step b).

29. The method of claim 28 further including the step of:

f) transmitting the three-dimensional model to an off-board storage.

30. The method of claim 29 wherein said step f) includes the step of transmitting the three-dimensional model wirelessly.

31. The method of claim 27 wherein only a single complete revolution is performed in said step b) before the three-dimensional model is performed in said step e).

32. The method of claim 27 further including the step of translating the source and the detector about an axis of the revolution during said step b).

33. The method of claim 25 wherein the body part is positioned below a horizontal plane containing the cross bar in said step a).

34. The method of claim 25 wherein said step b) further includes the step of rotating the source and the detector relative to a mount positioned above the cross bar and connected to the cross bar.

35. The method of claim 34 further including the step of:

e) prior to said step a), hanging the cross bar, the source and the detector from the mount.

36. The method of claim 35 wherein the cross bar, the source and the detector hang vertically downwardly from the mount after said step e).

37. The computed tomography scanner of claim 20 wherein the mount is positioned vertically above the cross bar.

38. The computed tomography scanner of claim 37 wherein the gantry is suspended vertically downward from the mount.

39. The computed tomography scanner of claim 14 wherein the source and the detector are suspended from the cross bar.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.